

MONTHLY WEATHER REVIEW.

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The MONTHLY WEATHER REVIEW is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Director Mete-

orological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian is used in the text of the MONTHLY WEATHER REVIEW.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea level and latitude 45°.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

A EUROPEAN COLD WAVE.

During the third decade of the month a cold wave of exceptional severity visited central and southern Europe. In central Russia there was a heavy loss of life and live stock by cold and heavy snow. Southern Russia and the Black Sea were swept by gales of great violence, attended by snow and intense cold. The harbor at Odessa was frozen over, and railroad lines in that region were buried in snow. The cold wave extended to the Mediterranean, and heavy snow fell in Turkey, Greece, Crete, and Asia Minor. The lagoons were frozen at Venice, while at Florence the cold was unprecedented and the River Arno was frozen. In the Alps the weather was intensely cold, 25° F. below zero being reported. Vienna reported the coldest weather in fifty years. In Germany the barometer is reported to have reached a height unsurpassed in the meteorological records of that country, and the temperature was the lowest recorded in twenty years, a minimum of 2° F. below zero being noted at Berlin. In Paris morning temperatures ranged from 14° to 20°. On the North Sea violent northeast gales were experienced. The cold wave extended over the British Isles with the heaviest snowfall in many years, four to six inches of snow being reported in Scotland and northern England.

The arrangement of barometric pressure that was preliminary and favorable to the setting in of this cold wave was shown on the morning of the 19th when a depression appeared over the Black Sea. At this time the barometer was highest, above 30.60 inches, from northern France over Germany and Denmark. By the 20th pressure had increased generally over central and northern Europe and western Siberia, with highest readings, above 30.80 inches, over northern European Russia. Over southwestern Europe the barometer had fallen rapidly. Pressure continued to increase over European Russia until the 22d, with a maximum reported reading of 31.42 inches at St. Petersburg. On the 23d the area inclosed by the isobar of 31.00 inches extended from central European Russia to the North and Baltic seas and the Gulf of Finland. On the morning of the 24th pressure had decreased rapidly over extreme southwestern Europe, the barometer reading at Lisbon being 29.42 inches. After the 24th barometric pressure over northern and western Europe diminished, the depression in the southwest apparently drifted northward over western Europe with a rapid decrease in intensity, and the cold moderated.

On the North Atlantic Ocean the weather was stormy during the second decade of the month.

Except in the extreme Northwest the first two decades of January were remarkably mild in the United States generally east of the Rocky Mountains. The balance of the month was cold, especially in the central valleys, Lake region, and Atlantic States. In New England the first half of the month was mild and the second half much colder than usual. During a cold wave on the 16-17th, temperatures 12° to 45° below zero were reported in Maine, and on the 24th readings were 25° below zero in the interior of New England. The principal cold wave of the month swept the middle and eastern districts in the third decade of the month, with freezing temperatures in the interior of the South Atlantic and east Gulf States, excepting Florida, on the 23d.

Precipitation was heavy in the central valleys, causing destructive floods in the Ohio and lower Mississippi rivers and tributaries, but was light in the Atlantic coast and Gulf States. Snowfall was unusually heavy in the Northern States from Minnesota to Idaho.

The severest gale of the month in the United States began on the Great Lakes the night of the 19th and continued during the 20th, causing great damage to vessels in harbors of the lower Lakes and lake side property.

A typhoon that resulted in a loss of 100 lives is reported as having swept the islands of Leyte and Samar, Philippine Islands, on the 10th.

BOSTON FORECAST DISTRICT.

The month as a whole was colder than the average, the mean temperature for New England, 20.5°, being 1.1° F. below the normal. During the first nine days the temperature was generally above normal. From the 10th to the 15th it was near the average. The weather became much colder on the 16th and 17th and from this time till the close of the month the temperatures were generally below normal. For the section as a whole the lowest temperature was on the 24th, when minimum readings of -25° or lower occurred in each State, except Rhode Island. During the cold wave of the 16-17th the temperatures were near or below zero in all sections, and 12° to 45° below zero in Maine. Many cooperative observers having records covering forty or more years state that the minimum temperature of the month is the lowest of record in January. There was an unusual amount of cloudiness, with precipitation on

an average on fifteen days. The monthly average precipitation for the entire district, 2.81 inches, is, however, 0.85 of an inch below the January normal. The depth of snowfall was not excessive, and ranged from 10 inches to slightly above 30 inches, the greatest fall being in parts of Maine. There were no storms during the month of greater severity than the average of those that occur at this season. The highest winds were general on the 9th and the 20th, with maximum velocities at coast stations between 36 and 56 miles per hour from the southwest, west, and northwest. There were no high easterly winds. So far as known there was no loss of vessels and no great damage to shipping during the month. Also there was less delay and inconvenience to shipping than is usually experienced in January, largely owing to the fact that the high winds and gales were offshore or westerly. No storms occurred for which warnings were not issued.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

Weather conditions during the month were in many respects abnormal. Precipitation was deficient in Louisiana and southern Texas, and was in excess in Arkansas, Oklahoma, and northern Texas. The temperature was excessive in all parts of the district.

No storm warnings were issued during the month and no general storm occurred along the coast.

The only cold wave of any extent occurred on the 25th and 26th, when a sudden and decided fall in temperature occurred over the entire district and cold-wave temperatures were recorded, except at a few stations. Cold-wave warnings were issued for Louisiana, eastern Arkansas, and eastern Texas, except the northwest portion, on the 25th. Cold-wave warnings were issued for small areas on the 14th, 29th, and 30th, but in these cases the high-pressure areas and attendant cold weather either changed their course or were dissipated before coming into the district.

Frost or freezing temperature warnings were issued for considerable areas on the 25th and were fully verified, but warnings issued for limited areas on a few other dates failed of verification because of the sluggish movement of the high-pressure areas. No frost, without warnings, occurred in the sugar and trucking districts.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

The weather for January was unusually mild during the first nineteen days; ten days of this period showed maximum temperatures above 60°, and on several days they were above 70° F. The January record for high temperatures was broken at many points. Another remarkable feature was the extraordinarily heavy rainfall which occurred over the Ohio Valley, the larger portion of Kentucky, and the extreme western portion of Tennessee, the remainder of the district receiving less than normal. At Louisville the total precipitation was 12.11 inches, and amounts ranging between 10 and 13 inches were recorded at many other places. As most of this fell in the first three weeks, it means that one-fourth of the normal annual precipitation occurred in that short time. Disastrous and widespread floods resulted, not only in the Ohio River, but in all the rivers and small streams in the States bordering the Ohio. At Louisville there were about two thousand acres, or about one-seventh of the area of the city, under water. There were eighteen hundred houses in the submerged portion, with many factories, coal yards, lumber yards, and railroad tracks. Ten thousand people were directly affected by the high water, besides thousands temporarily out of employment. River traffic was suspended and the coal supply threatened. The estimated property loss was between \$400,000 and \$500,000. Timely warnings and advices as to the flood were issued from the Weather Bureau office, besides thousands of inquiries answered over the telephone.

Cold-wave warnings were issued for all or a part of the dis-

trict on the 15th, 19th, 20th, 22d, 24th, 25th, 29th, and 30th. Five of these warnings were fully justified, one was fully verified, while two failed entirely because the high-pressure areas retreated and moved off rapidly to the north.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT. *Not received.*

DENVER FORECAST DISTRICT.

During four-fifths of the month low-pressure areas were either central in the district or so near as to exert a controlling influence to the extent that mild and unsettled weather predominated. In western Colorado the mean temperature was the highest of record, while in northern New Mexico and the greater part of Utah, the precipitation, which came principally in the form of rain, was exceptionally heavy for January.

There were no cold waves, and such cold periods as occurred were covered by forecasts and special warnings.—*Frederick H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

The month opened with cold weather and light north wind thruout most of the State. At San Diego a maximum wind of 36 miles per hour from the north occurred, and at Independence a maximum wind of 40 miles per hour from the same direction. Heavy frosts were general on the 1st and 2d, and in the southern portion of the State on the 3d. On the 3d a depression of considerable depth appeared on the northern coast. This past eastward and on the 5th frost warnings were issued for California. On the morning of the 6th heavy frost occurred thruout the State.

Snow fell on Mount Tamalpais, on the Berkeley Hills, and in the Coast Range. A marked depression quickly followed the cold wave. Heavy snow fell at numerous points. In some respects this was the heaviest snowfall in central California for many years. A brief interval of clear, cool weather was followed by another period of heavy rain, beginning the 13th. Heavy frost occurred at San Francisco on the 15th. Frost warnings were issued for the northern portion of the State on the same date. Heavy frost occurred on the 16th. Frost warnings were issued for northern California on the 17th and for southern California on the 18th and 19th. Heavy frost occurred on the 19th and 20th.

During the last decade the weather was unsettled with frequent showers, and the month ended with moderate rain and brisk southerly winds over the central and northern portions of the State.—*Alexander G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

The month was abnormally cold, except in southern Idaho, where temperatures were about 2° F. above normal. At Portland the month was the coldest in seventeen years and much ice formed in the Columbia and Willamette rivers. In the Columbia River an ice gorge extended for several miles below The Dalles and navigation ceased between Portland and that city on the 10th, and was not resumed during the remainder of the month. The ice in the Willamette River was not sufficient at any time to interfere with navigation. The cold spell came on so gradually that cold-wave warnings were not required; the only one issued was for a limited portion of the district and it was not justified.

There were but few windstorms, the heaviest of which occurred on the 3d, when a maximum velocity of 84 miles was recorded at North Head, Wash. Timely warnings were issued for this and all the other storms sufficiently severe to need them. The heavy rains attending the storm of the 3d caused a sharp rise in the Willamette River and a flood occurred in the upper portion of the valley, but the subsequent cold weather so checked the rising waters that the stage in the lower portion of the valley was not sufficiently high to cause any material inconvenience.—*Edward A. Beals, District Forecaster.*